National Site Assessment Symposium Training Program
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Denver, Colorado

Assessment Strategies for PFAS Case Study for the Blades Groundwater Site

U.S. EPA, Region 3

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Discuss Blades, DE, describe geographical setting

Objectives:
The aim of the investigation was to identify strategies for EPA and stakeholders to extend best methods and testing for PFAS releases and to establish a plan with strategies and best management practices for data collection.

Focus areas for this Site Inspection: regulation, mapping and geospatial data, including fate, transport and toxicology,

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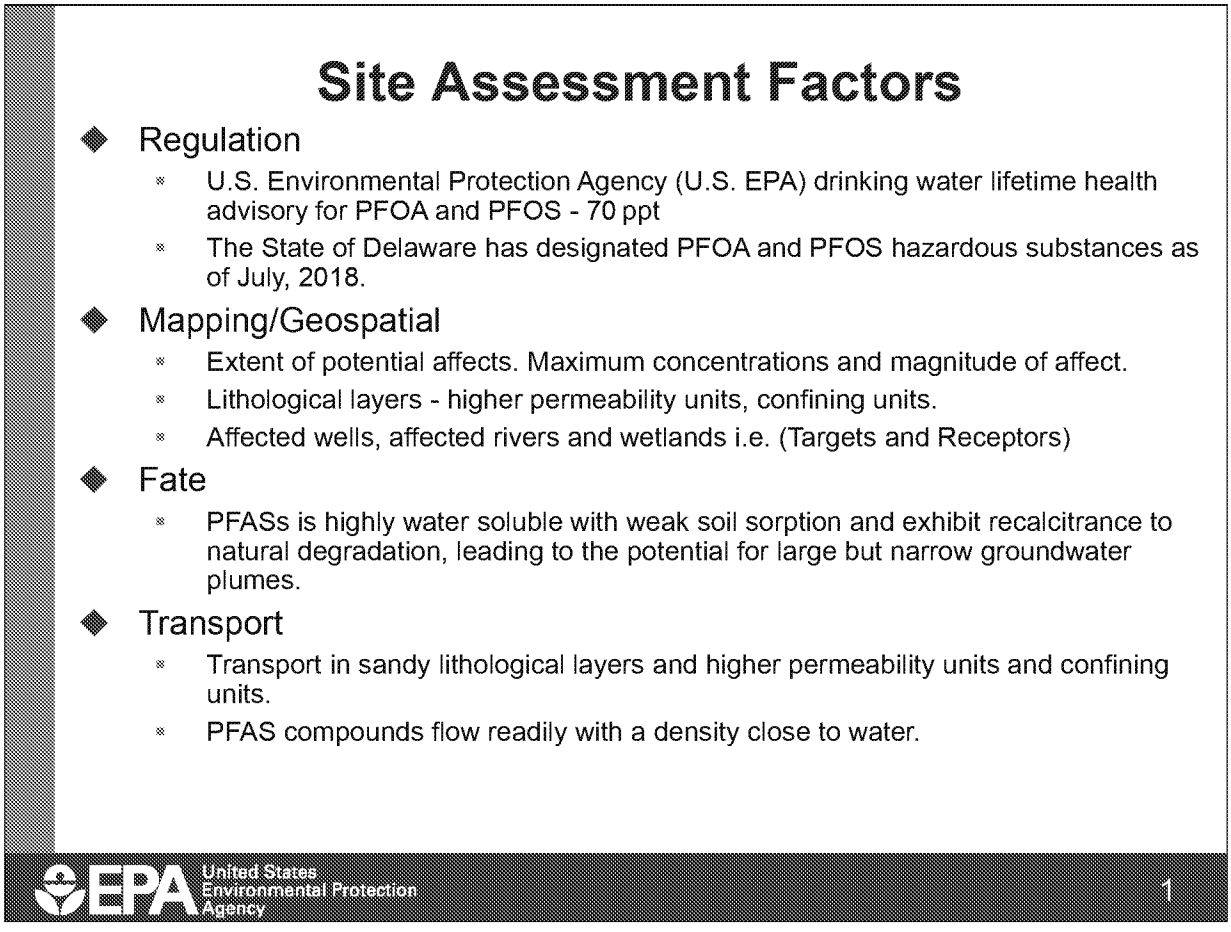


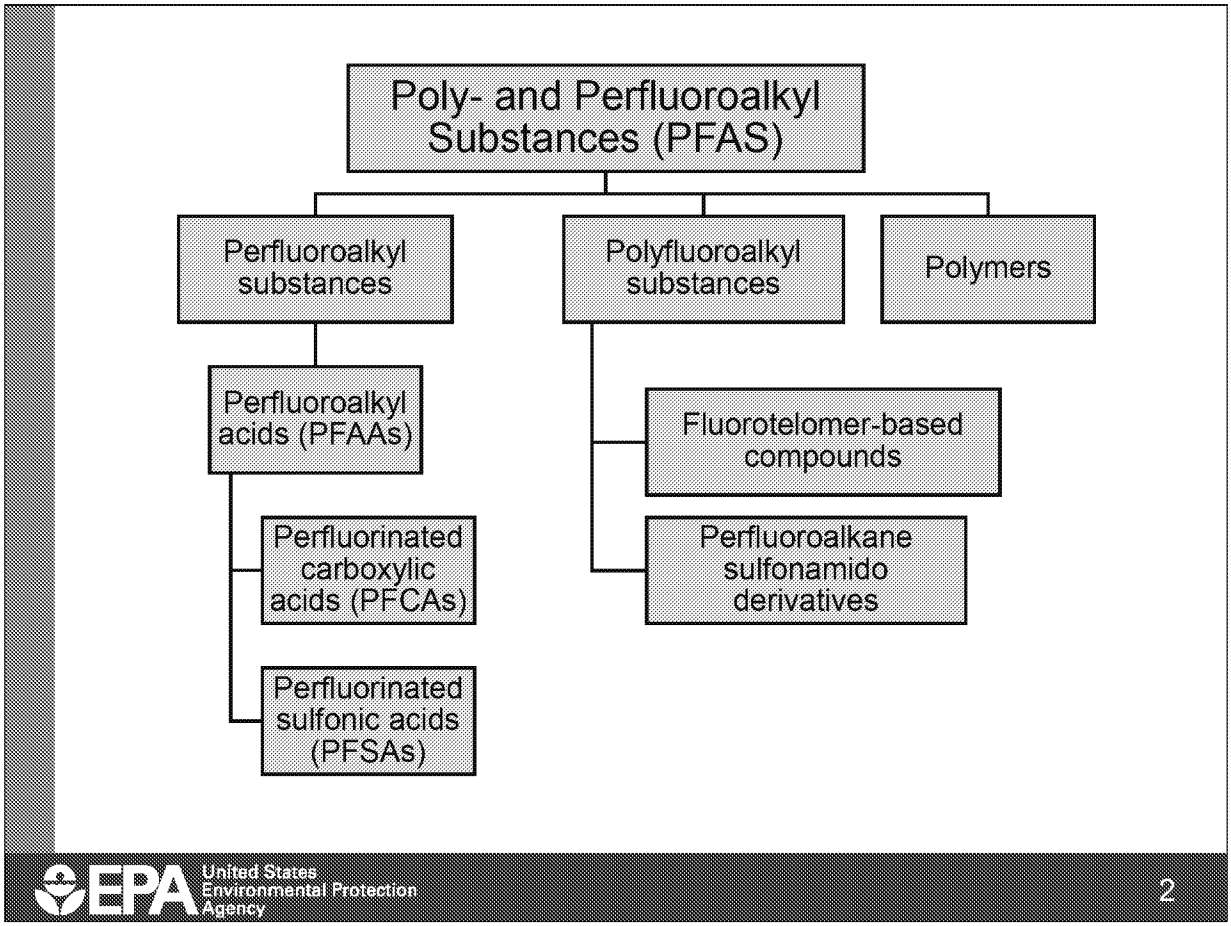
-Focus areas: mapping/geospatial, including fate, transport, toxicology, and regulation
-In particular, there is still considerable uncertainty regarding human health impacts of PFASs.
-Frameworks sequentially evaluating exposure, persistence, and treatability can prioritize PFASs for evaluation of potential human health impacts.
-This site-wide case study illustrates how geospatial and standard investigatory methods can help address knowledge gaps regarding potential sources of PFASs in this particular drinking water aquifer and evaluate risk of exposure to human health.

Toxicology
Groundwater Pathways – GW, SW, SED, Soil, ATM
Receptors Impacted
Types of PFAS onsite

Two commonly cited PFAS compounds have the following behavior:
Perfluorooctanoic acid (PFOA) at environmental pH is the anion perfluorooctanoate with estimated water solubility of 9,500 mg/L and negligible vapor pressure
Perfluorooctane sulfonate (PFOS) has an estimated water solubility of 680 mg/L and negligible vapor pressure
Both have long half-life, and high solubilities. Long narrow plumes. PFAS does not have LNAPL or DNAPL.
The PFAS compounds can bind to free TOC and iron in the water.

Long-chain PFASs (PFHxS,PFOS, PFOA, and PFNA) more in groundwater

Short-chain compounds (PFHpAand PFBS) more in surface waters.



PFAS are not lipophilic but bind to proteins such as serum albumin.
Environmentally persistent, does not degrade completely under natural conditions.
Chemical stability, surfactant behavior, stain resistant, low polarization, covalent bonds (Carbon-Fluroine)

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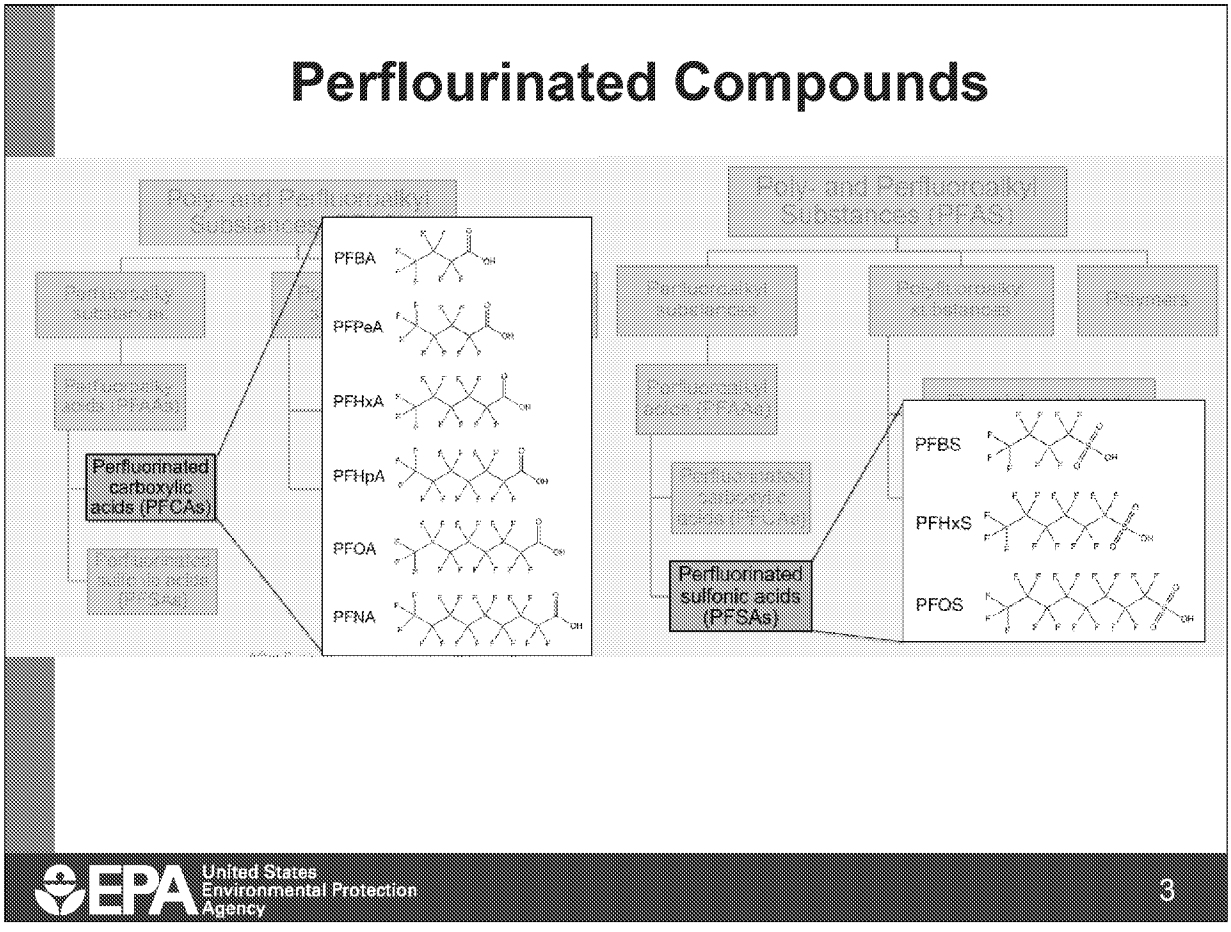

Ex. 5 Deliberative Process (DP)

Site Assessment Specifics

- Where is the PFAS contamination coming from?
  - EPA identified the use of PFAS containing *Fumetrol* 140 and chromium tetrafluoroborate use at two electroplating facilities.
  - EPA and Delaware's DHSS identified PFAS in three public wells near two adjacent industrial plating facilities.
  - EPA identified PFAS contamination in 9 of 50 residential wells.
  - EPA is currently conducting an SI to determine the source(s) of the PFAS contamination.
    - The contamination from both facilities may be comingled - PFAS, chromium, and cyanide.
  - Both facilities used multiple types of plating processes.
  - Chromium and cyanide identified in several residential wells.

-In particular, there is still considerable uncertainty regarding human health impacts of PFASs.
-This site-wide case study illustrates how geospatial and standard investigatory methods can help address knowledge gaps regarding potential sources of PFASs in this particular drinking water aquifer and evaluate risk of exposure to human health.

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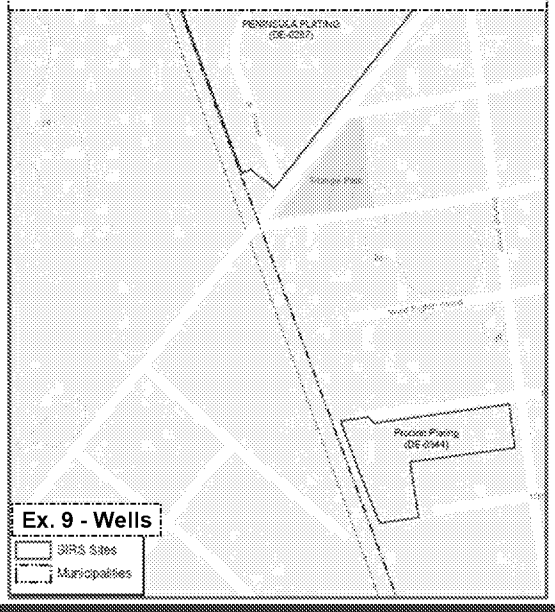
Site Location and Targets

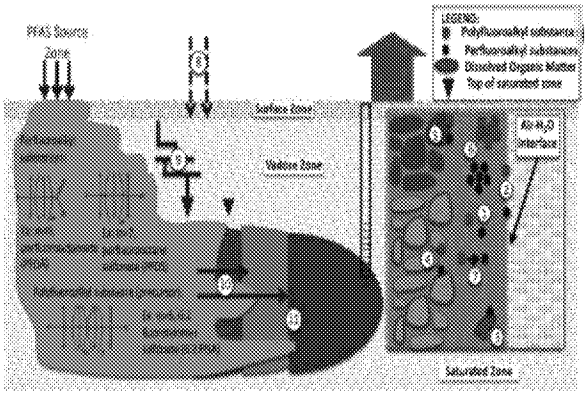
- Sample Results
  - Three wells had results exceeding the combined PFOA/PFOS HAL.
    - Drinking Water - 193.0, 117.5, and 96.2 (ppt)
  - Nine residential wells had concentrations above the HAL. Delaware installed treatment for the these residential wells.
    - One residential well had a concentration of 364 ppt.
- EPA still conducting assessment of the groundwater plume.
  - Known contamination of the groundwater and soil
  - Threats to the surface water (human food chain, wetlands)
  - Inadequate controls and no remediation of groundwater to date
  - Abundant potential source soils at the two facilities

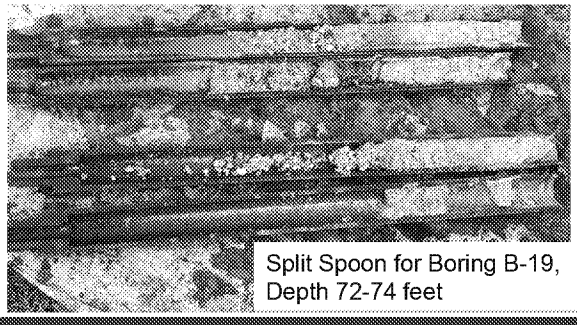
Ex. 5 Deliberative Process (DP)

Site Location and Targets

Ex. 9 - Wells

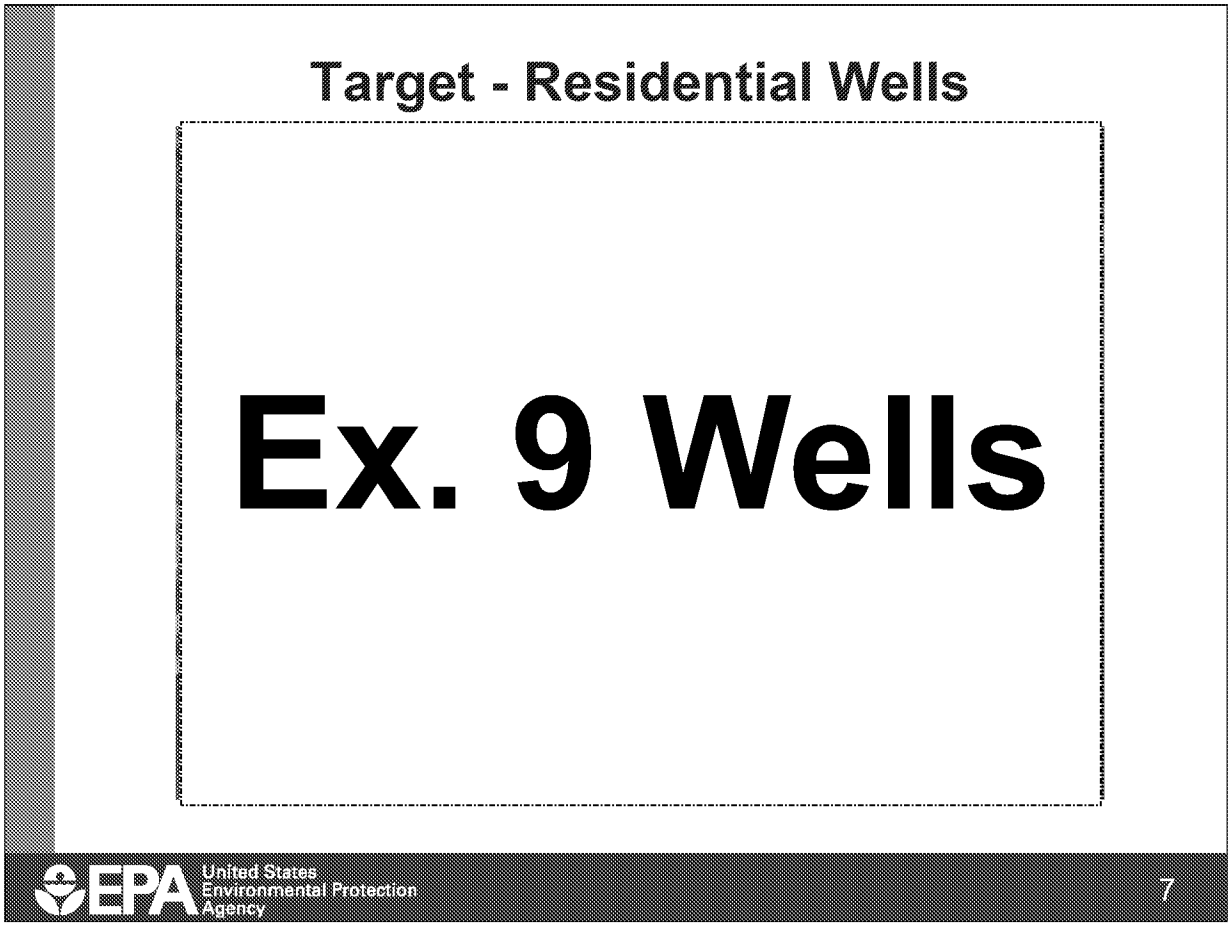






Split Spoon for Boring B-19, Depth 72-74 feet

Ex. 5 Deliberative Process (DP)



Coordinated with EPA's Removal Program to quickly collect residential well samples.

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Site Assessment Responses to Contamination

Response to the PFAS contamination

- Treatment system installed on the three municipal wells.
- EPA is conducting a Site Inspection
  - Well Drilling – 18 new well clusters (shallow, intermediate, deep)
  - Collected 9 comingled surface water and sediment samples to determine regional impacts
  - Collected groundwater samples
  - Review residential data from the 50 wells.
  - Review the sewer system and onsite water treatment plants
  - Investigate other facilities that may have used or use PFAS.

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Site Assessment Strategy

- PFAS contamination response
  - Resample the Town of Blades wells
- Installed 18 new monitoring wells
  - Shallow wells - identify or eliminate source areas. (≈16 feet)
  - Intermediate wells - determine if the two facilities are comingled and determine hydrological flow direction. (≈45 feet)
  - Deep wells - determine if the facilities are comingled, regional flow/pumping direction, and cone of influence of the public wells. (≈96-105 feet)
- Sample existing wells on the Procino Plating facility to determine the extent of a release.
  - Review the method of transporting electroplating fluids through onsite water handling systems and into the sewer system.
- Review site documents and hydrology.

Talk about well drilling and technology used for the investigation

Ex. 5 Deliberative Process (DP)

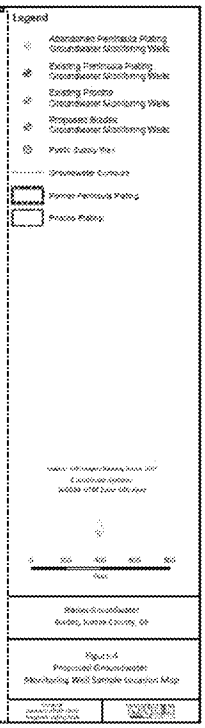
Site Assessment Strategy

Ex. 9 Wells

Ex. 5 Deliberative Process (DP)

Site Assessment Strategy

Ex. 9 Wells



EPA United States Environmental Protection Agency

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Talk about map...

Ex. 5 Deliberative Process (DP)

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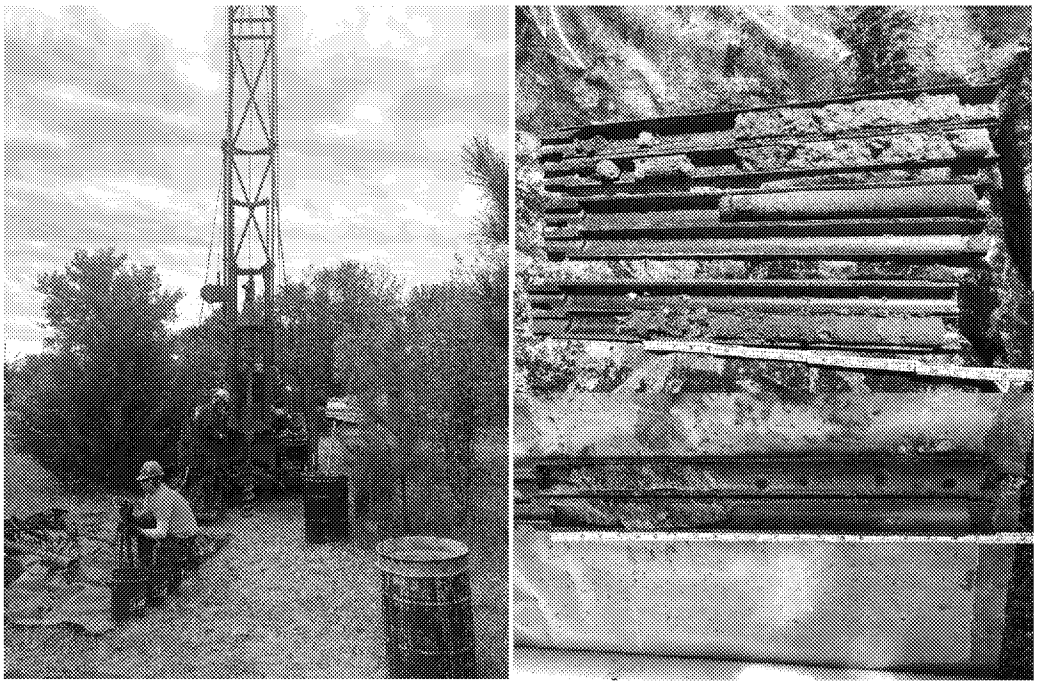
Site Assessment Photographs



EPA United States Environmental Protection Agency

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Ex. 5 Deliberative Process (DP)

Site Assessment Photographs

EPA United States Environmental Protection Agency

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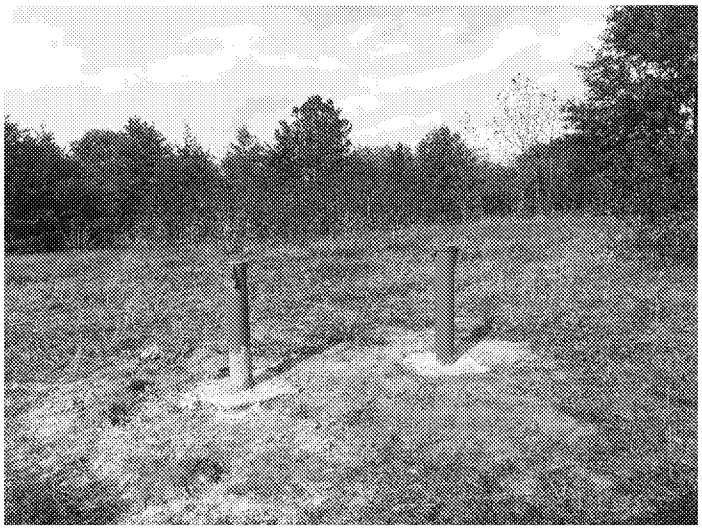
Blades Groundwater Success Story

- Cooperative Agreement between EPA and DNREC allowed for open communication identifying contamination of the public wells.
- EPA, DNREC and the Town of Blades were able to provide safe drinking water in several days to the public once the sample results were available.
- DNREC and the town installed a public treatment system in several weeks after discovery of PFAS in the public and residential water system.
- EPA's removal group samples residential wells and provided the public with treatment systems.
- EPA is currently conducting the SI in consultation with DNREC.

Site Assessment Photographs

Any Questions?



Completed groundwater monitoring wells for the SI investigation, down gradient wells over 3000 feet from the sources.

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